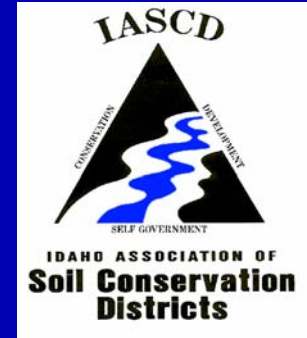
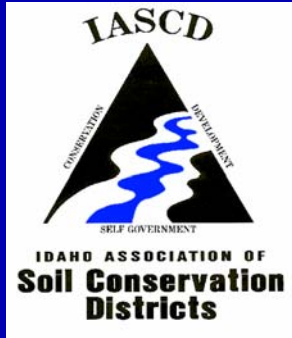


Cassia and Minidoka Counties Agricultural Water Quality Monitoring Report



Technical Results Summary #4
Twin Falls Idaho

October 2003

Introduction

The Idaho Association of Soil Conservation Districts (IASCD) conducts surface water quality monitoring throughout the state to provide information on water quality conditions and the effectiveness of agricultural practices in improving water quality. To support the West Cassia Soil and Water Conservation District (SWCD), East Cassia SWCD and Minidoka SWCD in assessing water quality, IASCD conducted water quality monitoring in the Mini-Cassia area from April 2002 through March 2003. The purpose of the project was to assess existing phosphorous loads delivered to the river through the agricultural drains and to identify mapped drains that no longer exist or do not deliver water to the Snake River. Information from the project will be used to determine agricultural loading of phosphorous to the Snake River and to help in planning future projects to improve water quality.

Background

The Lake Walcott Total Maximum Daily Load (TMDL), a document written by the Idaho Department of Environmental Quality (IDEQ) in 1999, sets a limit for phosphorous concentrations in the Snake River between Minidoka Dam (river mile 675) and Milner Dam (mile 639). The Lake Walcott TMDL set a yearly average

limit of 0.080 mg/L of total phosphorous (TP), with an individual maximum of 0.128 mg/L (Lay, 1999). The Snake River through this reach receives return flow from dozens of small agricultural return drains and small creeks that are not specifically assigned phosphorous load limits, but which contribute loads to the river. During the process of writing the TMDL, approximately 60 points were identified from maps where a drain or creek was shown to enter the Snake River. Not all of the 60 points from the map exist as stream channels or drains. In each case where data from one of the 60 drains did not exist, DEQ assigned an average phosphorous load value based on the total estimated non-point source phosphorous load. Monitoring efforts by the Burley Irrigation District (BID), Minidoka Irrigation District (MID), Bureau of Reclamation (BOR) and IASCD have coordinated to provide phosphorous data for as many of the 60 drains as possible. This project involved collecting water quality data from 12 agricultural drains and making regular observations at an additional 15 drains to identify major contributors and those that are no longer used.

Monitoring Schedule and Site Descriptions

IASCD collected water quality samples once per month from 12 drains between April 2002 and March 2003 and made monthly observations at 15 additional sites. Only

three of the 27 sites had water year-round. The others were dry after irrigation ended in October so only three sites had samples collected during the winter.

The 12 monitoring sites and 15 observation sites were selected as close to each confluence with the Snake River as access would allow. Of the 12 monitoring sites, five were located on the south side of the river in Cassia County and seven on the north side of the river in Minidoka County (Figure 1). At each visit, samples were collected for total suspended solids (TSS), volatile suspended solids (VSS), total phosphorous (TP), and ortho phosphorous (OP). Discharge rates at the sites varied depending on irrigation practices. Some sites were dry while others had water, depending on where excess water from the canal system was spilling at any given time.

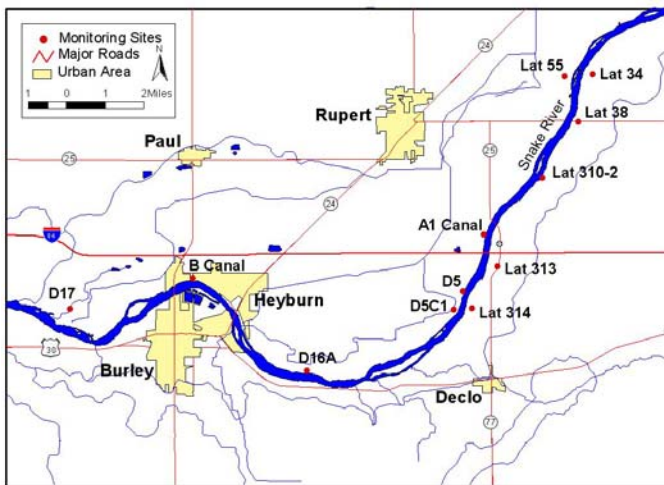


Figure 1. Monitoring Site Locations

Results

The Lake Walcott TMDL does not set specific limits for pollutant loads entering the Snake River from agricultural return drains. It does set limits for concentrations in the Snake River itself and the 12 drains sampled for this project empty directly into the Snake River. Average values from the data collected during the irrigation season and the non-irrigation season are shown in Table 1 and Table 2. Limits established for the Snake River in the Lake Walcott TMDL for total suspended sediment, TP, and OP are also shown.

Stream Discharge

Return flows from the drains returning to the Snake River are not significant relative to the flow of the river. Total discharge from the 12 sampled drains during the irrigation season averaged only 28.3 cfs (Table 1)

compared to an average of about 7400 cfs (USGS, 2003) in the Snake River. Non-irrigation season averages were 3.4 cfs for the drains (Table 2) and approximately 600 cfs in the river. Although USGS data for the 2002-03 winter are not yet published, the previous two winters (2000-2001 and 2001-2002) showed average flows in the river of just over 600 cfs during the non-irrigation season. Releases from American Falls and Minidoka Dams during the 2002-2003 winter were managed very similarly to the previous two seasons. The flow from these 12 drains is approximately 0.4% and 0.6% of the water in the river during the irrigation and non-irrigation seasons respectively.

Table 1. Irrigation Season Average Values for Water Quality Parameters

	Q (cfs)	TSS (mg/L)	VSS (mg/L)	TP (mg/L)	OP (mg/L)
TMDL Limit	n/a	25	n/a	0.08	n/a
D17	1.9	5	3	0.09 ^a	0.04
D5C1	3.3	3	3	0.12 ^a	0.08
D5	3.8	2	2	0.08	0.06
B Canal	2.5	4	3	0.05	0.03
D16A	3.6	2	2	0.07	0.04
Lat314	1.0	1	1	0.07	0.04
Lat313	2.0	5	3	0.08	0.04
A1 Canal	2.5	2	2	0.08	0.05
Lat310-2	1.2	9	3	0.05	0.03
Lat38	2.1	3	2	0.07	0.04
Lat34	2.9	3	3	0.09 ^a	0.04
Lat55	1.6	1	1	0.07	0.04
Total	28.3				

Shaded cells indicate levels above TMDL standard for the Snake River of 0.08 mg/L

Table 2. Non Irrigation Season Average Values

	Q (cfs)	TSS (mg/L)	VSS (mg/L)	TP (mg/L)	OP (mg/L)
TMDL Limit	n/a	25	n/a	0.08	n/a
D5	2.9	6	3	0.11	0.05
D17	0.3	3	3	0.09	0.04
D5C1	0.2	7	3	0.12	0.05
Total	3.4				

Shaded cells indicate levels above TMDL standard for the Snake River of 0.08 mg/L

Total Suspended Solids

TSS levels for all 12 sites were well below the 25 mg/L limit for total suspended sediment. The highest individual TSS measurement was 25 mg/L and only 5 samples were above 10 mg/L for the entire project. Average TSS levels were very low for all the drains throughout the entire year.

Low TSS values were likely the combination of several factors. First, the water entering the canal system at Minidoka Dam generally has very low TSS levels. Second, the topography of the area is flat and the gentle slope of canals, ditches and drains minimizes canal bank erosion. Third, the majority of cropland in the area is sprinkler irrigated and runoff from fields is not common. Water in the drains is generally excess canal water returning to the river and not runoff from agricultural fields.

Total Phosphorous

The TP concentration of water entering the canal system at Minidoka dam averages approximately 0.06 mg/L. Samples collected by the University of Idaho averaged 0.06 mg/L at Jackson Bridge for the same period of time as this project. Although Jackson Bridge is four miles below Minidoka Dam, it best represents the quality of water entering the canal system at Minidoka Dam. Other data collected by the Idaho Department of Environmental Quality (DEQ) over a period of years in the mid to late 1990's showed an average TP of 0.061 mg/L at Minidoka Dam where water is diverted into the canal system.

The TMDL sets total phosphorous targets at a yearly average of 0.080 mg/L. TP levels at the 12 sites were generally very near that level (Table 3, Figure 2).

Of the 12 monitoring sites, three sites had averages above the 0.08 mg/L target, three sites were at the target and six sites were below it. Some drains were above the annual standard. But the average cumulative irrigation season load for all 12 drains was below what the cumulative load would be if all drains were at the target concentration of 0.08 mg/L (Table 4). Although some individual drains were slightly above the limit, the 12 drains cumulatively were below the target during the irrigation season.

During the non-irrigation season, only three sites had water. All three sites had TP concentrations above the 0.08 mg/L limit during the winter. The average TP load

for that period was 2.28 lbs/day, above the 1.48 lbs/day load that would exist if the drains were at the 0.08 mg/L average concentration (Table 4).

Table 3. Total Phosphorous Concentration Annual Averages

Site	TP	Site	TP
D17	0.09	Lat313	0.08
D5C1	0.12	A1 Canal	0.08
D5	0.09	Lat310-2	0.05
B Canal	0.05	Lat38	0.07
D16A	0.07	Lat34	0.09
Lat314	0.07	Lat55	0.07

Shaded cells indicate levels above TMDL standard for the Snake River of 0.08 mg/L

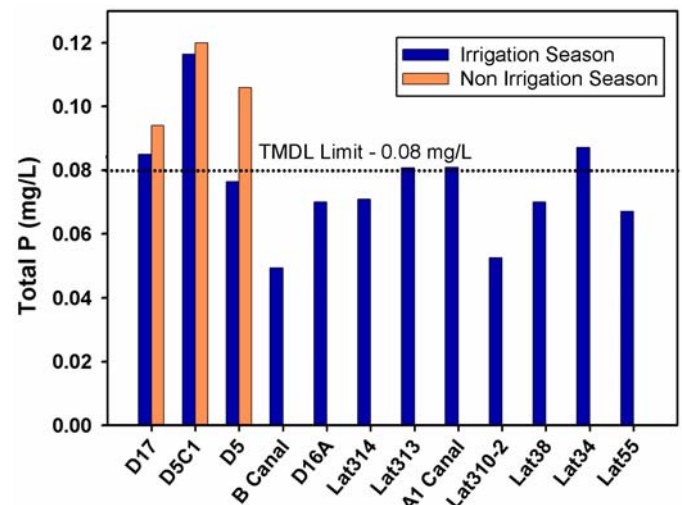


Figure 2. Average Total Phosphorous Concentrations

Even with the higher TP concentrations in the three perennial drains, the average concentration of all 12 drains combined is meeting the annual target set by the TMDL. The combined average flow (15.9 cfs) and phosphorous loads (6.80 lbs/day) for all 12 drains over the entire year yielded an average TP concentration of 0.079 mg/L to the Snake River, just less than the 0.08 mg/L limit.

The average daily phosphorous load to the Snake River was 7.02 lbs. Approximately 58% of that load was dissolved phosphorous. This indicates that the majority of phosphorous is not associated with sediment loading.

Table 4. Average Phosphorous Loads During Irrigation Season, Non Irrigation Season and Annual Average

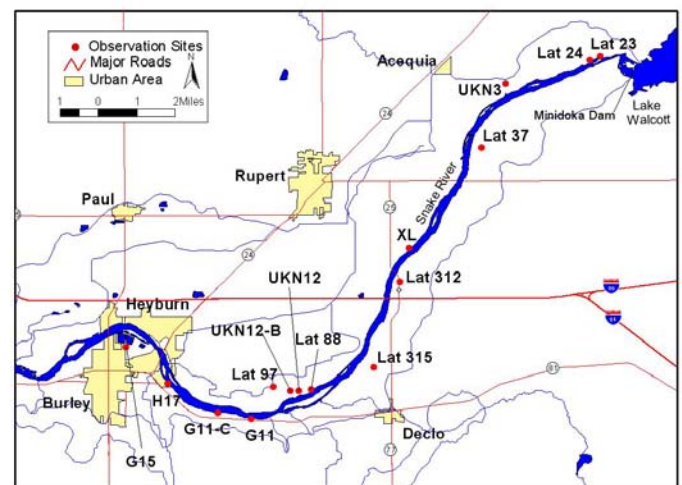
All units (lbs/day)	TP Load	TMDL TP Load	TP Load	TMDL TP Load
	Irrigation Season		Annual Average	
D17	0.75	0.82	0.50	0.53
D5C1	1.55	1.40	1.05	0.85
D5	1.82	1.65	1.88	1.49
B Canal	0.52	1.07	0.26	0.53
D16A	1.28	1.56	0.64	0.78
Lat314	0.43	0.42	0.22	0.21
Lat313	0.73	0.85	0.36	0.42
A1 Canal	1.08	1.09	0.54	0.54
Lat310-2	0.33	0.50	0.16	0.25
Lat38	0.80	0.91	0.40	0.46
Lat34	1.30	1.24	0.65	0.62
Lat55	0.71	0.70	0.35	0.35
Total	11.30	12.21	7.02	7.04
	Non Irrig Season			
D17	0.16	0.13		
D5C1	0.17	0.08		
D5	1.96	1.26		
Total	2.28	1.48		

Only three of the twelve sites monitored during this project had perennial flow, and they were all among the sites with annual TP averages at or above the TMDL limit of 0.08 mg/L. Characteristics unique to these three drains include their vertical position relative to the surrounding ground level and their location (north side of the river in Minidoka County). The area just north of the river in Minidoka County has perched, irrigation induced aquifers that are generally shallower than on the south side of the river (Minidoka Soil and Water Conservation District, 1996). This is important because these three drains (D17, D5 and D5C1) have incised channels located below the surrounding ground level, unlike the other nine drains. The other drains are constructed channels above the surrounding ground level. The shallow aquifer provides ground water seepage to lower lying drains during the winter when irrigation water is turned off. Water in these three drains includes excess canal water during the irrigation season (like the other nine drains), but also includes perennial ground water seepage.

The higher TP concentrations in the perennially flowing drains are likely the result of higher dissolved phosphorous levels in ground water seepage that provides much of their flow. It appears that ground water quality is the driving factor in higher TP concentrations, not surface water quality or agricultural surface runoff.

Observation Site Results

Fifteen additional drains were included as part of this project in order to gather information about flow returning to the Snake River. Actual water quality samples were not collected at these drains, but a rough estimate of stream discharge (if any) and conditions were made at each site on the same days that samples were collected at the monitoring sites. The information has been used to determine which of the 60 drains identified during the development of the TMDL actually have water on a regular basis or are used at all. As with the monitoring sites, observation sites were chosen as close to the Snake River as access would allow. Of the drains, 7 were on the south side of the river (Cassia County) and 8 were on the north side (Minidoka County). The sites are shown in Figure 3.



exceeded 1.0 cfs. A summary of each drain and the average flow for when water was flowing in the drain are shown in Table 5.

Table 5. Observation Site Information

Drain	Description	Mean Q
H17	No flow observed	n/a
G11C	No flow observed	n/a
G11	No flow observed and no sign of flow between visits	n/a
UKN 12	Drain doesn't exist	n/a
UKN3	Spill channel for Main Canal – never flowed	n/a
Lat88	No flow observed	n/a
Lat312	Flow observed once	0.3 ^a
G15	Flow observed once	0.5 ^a
UKN12-B	Flow observed once	0.5 ^a
Lat97	Flow observed once	0.1 ^a
XL	Flow observed sporadically	0.6
Lat 315	Flowed regularly	0.8
Lat 37	Flowed regularly	0.5
Lat 23	Flowed regularly	0.5
Lat 24	Flowed regularly	0.8

^a Actual Q, flow observed only once

The information from these 15 drains has been included with other data collected among the 60 total possible drains identified in the TMDL. The three area SCDs, MID, and BID are trying to account for loads to the river based on actual data and not on averages assigned to drains with unknown loads. The observation process identified which drains discharge regularly (Laterals 315, 37, 23 and 24) and which drains discharge rarely, if ever (H17, G11C, G11, UKN 12, UKN 3, Lateral 88).

Conclusions and Recommendations

Return flows to the Snake River from the 12 drains sampled during this project were just below total phosphorous limits established in the Lake Walcott TMDL. Perennially flowing drains appeared to have higher average TP concentrations than other drains. Overall, the drains returned water to the river that was very low in sediment and slightly higher in TP (+0.018mg/L) than when it was diverted from the river at Minidoka Dam. Agricultural practices appear to be adequate with regards to protecting surface water runoff returning to the Snake River. Runoff from agricultural fields is almost nonexistent and the excess canal water returning to the river is of good quality. Irrigation management efforts should be maintained to minimize surface water runoff to the river.

Higher TP levels occurred in drains where groundwater influenced discharge. Perennial flow from seepage into low-lying drains may be indicative of excessive phosphorous in soils of surrounding fields. Loads from the three perennial drains sampled in this project were not extremely high, but the shallow ground water in the area is very susceptible to nutrient loading if nutrient and irrigation management are not done properly.

Ground water best management practices, specifically nutrient management and irrigation water management, should be a priority to reduce nutrient loading to shallow aquifers that provide perennial flow to return drains.

Acknowledgements

IASCD thanks Shawn Stout (formerly with the Bureau of Reclamation) and Arnie Wetzstein (formerly with the Idaho Soil Conservation Commission) for their help in organizing information from the 60 agricultural drains and creeks between Minidoka and Milner Dams. A big thanks also goes to: Analytical Labs in Boise, Idaho for their help with sample analyses; Kirk Campbell and Gary Bahr of the Idaho State Department of Agriculture for their technical support; and Chris Fischer and Ken Clark of IASCD for comments and suggestions.

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Appendix A Data Sheets

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Drain D17													
Date	Flow	DO	Temp	% Sat	Cond	Salinity	TDS	pH	TSS	TVSS	Total P	Ortho P	Time
	cfs	mg/L	Cel		µS	ppt	mg/L		mg/L	mg/L	mg/L	mg/L	
25-Apr-02	0.2	14.34	18.4	152.9	1614	0.8	798	8.58	23	9	0.16	<0.05	13:35
21-May-02	1.5	5.94	9.5	52.0	1719	0.8	824	8.04	6	6	0.06	<0.05	09:35
18-Jun-02	2.0	16.16	16.7	166.2	-	-	-	8.07	<2	<2	<0.05	<0.05	15:20
18-Jul-02	4.0	8.78	16.6	90.2	1724	0.9	845	7.52	<2	<2	0.05	<0.05	12:15
29-Aug-02	3.0	2.76	14.4	27.0	1707	0.9	841	7.46	<2	<2	0.10	0.07	09:45
18-Sep-02	1.8	7.21	12.8	68.2	1820	0.9	894	7.43	3	3	0.15	<0.05	13:30
10-Oct-02	0.8	3.23	9.5	22.3	1980	1.0	957	7.51	<2	<2	0.05	0.05	09:30
14-Nov-02	0.6	7.54	6.8	61.8	888	0.4	418	7.47	4	4	0.11	0.07	11:45
18-Dec-02	0.4	12.21	3.4	91.8	865	0.4	396	7.74	<2	<2	0.11	0.05	13:00
21-Jan-03	0.3	10.69	7.1	90.0	861	0.4	406	7.52	<2	<2	0.07	<0.05	14:15
11-Feb-03	0.2	10.57	7.6	88.3	812	0.4	386	7.45	5	4	0.07	<0.05	12:30
24-Mar-03	0.1	15.34	13.6	147.7	783	0.4	373	8.42	6	4	0.11	<0.05	15:25

D5C1 Drain													
Date	Flow	DO	Temp	% Sat	Cond	Salinity	TDS	pH	TSS	TVSS	Total P	Ortho P	Time
	cfs	mg/L	Cel		µS	ppt	mg/L		mg/L	mg/L	mg/L	mg/L	
25-Apr-02	0.6	9.12	15.3	91.2	1217	0.6	591	8.30	11	9	0.10	<0.05	17:25
21-May-02	10.7	10.02	11.1	91.2	1258	0.6	602	8.23	5	5	<0.05	<0.05	15:15
18-Jun-02	2.0	3.31	16.1	33.5	-	-	-	7.53	3	3	0.13	0.08	09:10
18-Jul-02	2.0	2.83	20.0	31.1	-	-	-	7.35	<2	<2	0.21	0.16	10:25
29-Aug-02	6.0	10.66	19.8	116.9	1383	0.7	674	7.86	<2	<2	0.14	0.08	15:45
18-Sep-02	1.1	9.31	14.8	91.8	1632	0.8	802	7.74	<2	<2	0.12	0.12	11:55
10-Oct-02	0.4	16.30	14.8	160.9	1957	1.0	966	7.88	<2	<2	0.09	0.06	14:30
14-Nov-02	0.4	17.44	6.5	142.0	1093	0.5	513	8.06	2	<2	0.14	0.08	13:05
18-Dec-02	0.3	15.91	1.0	111.9	1139	0.5	510	7.98	4	3	0.14	0.07	14:05
21-Jan-03	0.2	16.31	0.8	114.1	1253	0.6	568	7.83	16	5	0.12	<0.05	15:10
11-Feb-03	0.1	17.59	0.7	123.0	1181	0.6	548	7.75	5	3	0.08	<0.05	14:00
24-Mar-03	0.0												

D5 Drain													
Date	Flow	DO	Temp	% Sat	Cond	Salinity	TDS	pH	TSS	TVSS	Total P	Ortho P	Time
	cfs	mg/L	Cel		µS	ppt	mg/L		mg/L	mg/L	mg/L	mg/L	
25-Apr-02	1.8	14.35	17.5	150.1	1629	0.8	797	8.55	4	4	<0.05	<0.05	16:55
21-May-02	6.2	11.41	10.1	101.5	1474	0.7	706	8.41	5	3	0.09	0.06	14:35
18-Jun-02	2.2	3.87	14.9	38.3	-	-	-	7.51	<2	<2	0.05	<0.05	09:35
18-Jul-02	5.5	4.75	18.8	51.0	-	-	-	7.38	<2	<2	0.15	0.13	09:50
29-Aug-02	1.3	10.16	16.1	103.3	1528	0.7	674	7.86	<2	<2	0.08	0.07	15:15
18-Sep-02	6.7	6.91	14.1	67.2	1418	0.7	690	7.76	<2	<2	0.08	0.08	11:30
10-Oct-02	3.1	8.32	11.0	75.5	1488	0.7	723	7.44	<2	<2	0.06	0.05	14:00
14-Nov-02	1.3	9.23	6.1	74.5	856	0.4	403	7.55	3	3	0.11	0.06	13:30
18-Dec-02	3.4	10.21	2.5	74.9	934	0.4	422	7.67	<2	<2	0.14	0.06	14:40
21-Jan-03	1.5	10.35	2.8	76.5	977	0.5	455	7.63	2	<2	0.09	0.06	16:05
11-Feb-03	7.9	14.29	1.7	102.6	1076	0.5	490	7.62	20	8	0.13	0.05	14:35
24-Mar-03	0.6	11.28	9.8	99.6	942	0.5	448	7.95	4	3	0.06	<0.05	16:15

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B Canal													
Date	Flow	DO	Temp	% Sat	Cond	Salinity	TDS	pH	TSS	TVSS	Total P	Ortho P	Time
	cfs	mg/L	Cel		µS	ppt	mg/L		mg/L	mg/L	mg/L	mg/L	
25-Apr-02	0.6	9.64	12.7	91.0	1443	0.7	702	8.45	5	3	0.07	<0.05	14:05
21-May-02	2.5	8.60	12.4	80.5	1084	0.5	520	8.25	4	4	<0.05	<0.05	10:10
18-Jun-02	1.5	8.56	20.0	94.1	-	-	-	8.48	5	5	0.05	<0.05	14:50
18-Jul-02	1.5	7.75	23.4	91.1	977	0.5	470	8.05	<2	<2	0.08	<0.05	11:45
29-Aug-02	0.8	8.50	18.0	89.7	1007	0.5	487	8.11	<2	<2	<0.05	<0.05	10:30
18-Sep-02	8.5	9.41	14.7	92.8	958	0.5	461	8.38	<2	<2	<0.05	<0.05	13:00
10-Oct-02	2.0	9.54	11.0	86.5	1422	0.7	686	8.23	8	8	0.07	<0.05	10:10

D16A Drain													
Date	Flow	DO	Temp	% Sat	Cond	Salinity	TDS	pH	TSS	TVSS	Total P	Ortho P	Time
	cfs	mg/L	Cel		µS	ppt	mg/L		mg/L	mg/L	mg/L	mg/L	
25-Apr-02	4.0	8.69	15.6	87.4	1211	0.6	590	8.09	5	4	0.14	0.07	18:00
21-May-02	3.8	9.14	11.8	84.4	1085	0.5	519	8.40	3	3	0.05	<0.05	16:20
18-Jun-02	1.6	7.40	17.7	77.5	1082	0.5	523	8.15	<2	<2	0.05	<0.05	08:35
18-Jul-02	3.6	6.82	23.0	79.5	1018	0.5	495	7.85	<2	<2	0.11	0.06	11:05
29-Aug-02	2.0	8.99	20.0	98.8	1056	0.5	512	8.09	<2	<2	0.09	0.05	16:15
18-Sep-02	4.9	9.29	15.3	92.7	1008	0.5	488	8.35	<2	<2	<0.05	<0.05	12:25
10-Oct-02	5.4	13.46	12.2	125.4	981	0.5	473	8.42	<2	<2	<0.05	<0.05	15:00

Lateral 314													
Date	Flow	DO	Temp	% Sat	Cond	Salinity	TDS	pH	TSS	TVSS	Total P	Ortho P	Time
	cfs	mg/L	Cel		µS	ppt	mg/L		mg/L	mg/L	mg/L	mg/L	
25-Apr-02	0.8	8.21	17.3	85.6	1197	0.6	582	8.38	2	2	0.05	<0.05	14:30
21-May-02	1.5	9.09	10.9	82.3	1100	0.5	524	8.27	<2	<2	<0.05	<0.05	10:50
18-Jun-02	0.0												14:25
18-Jul-02	1.5	88.50	23.1	103.5	992	0.5	480	8.27	<2	<2	0.09	0.05	13:15
29-Aug-02	1.0	8.80	17.2	91.5	988	0.5	476	8.08	<2	<2	0.13	0.06	11:30
18-Sep-02	1.5	10.21	16.7	105.0	948	0.5	458	8.17	2	2	0.07	0.05	14:00
10-Oct-02	0.6	10.26	10.7	92.4	999	0.5	479	8.32	<2	<2	0.06	<0.05	10:50

Lateral 313													
Date	Flow	DO	Temp	% Sat	Cond	Salinity	TDS	pH	TSS	TVSS	Total P	Ortho P	Time
	cfs	mg/L	Cel		µS	ppt	mg/L		mg/L	mg/L	mg/L	mg/L	
25-Apr-02	1.4	9.47	15.3	94.6	1183	0.6	576	8.29	9	4	0.07	<0.05	15:00
21-May-02	2.6	9.69	11.4	88.7	1092	0.5	522	8.47	6	3	<0.05	<0.05	11:20
18-Jun-02	3.4	8.96	18.6	95.7	-	-	-	8.43	3	3	0.06	<0.05	14:05
18-Jul-02	2.8	8.09	23.1	94.7	988	0.5	475	8.28	4	3	0.09	0.05	13:40
29-Aug-02	0.3	8.84	18.6	94.5	991	0.5	477	8.21	7	3	0.13	0.06	11:50
18-Sep-02	2.0	8.10	17.3	84.3	949	0.5	458	8.09	4	2	0.06	0.06	14:25
10-Oct-02	1.3	10.98	11.0	99.5	997	0.5	479	8.29	<2	<2	0.13	<0.05	11:20

A1 Drain													
Date	Flow	DO	Temp	% Sat	Cond	Salinity	TDS	pH	TSS	TVSS	Total P	Ortho P	Time
	cfs	mg/L	Cel		µS	ppt	mg/L		mg/L	mg/L	mg/L	mg/L	
25-Apr-02	2.7	9.23	13.8	89.3	1207	0.6	586	8.22	<2	<2	0.06	<0.05	16:20
21-May-02	5.2	9.35	12.4	87.7	1114	0.5	534	8.57	6	6	0.06	<0.05	14:00
18-Jun-02	0.0												10:00
18-Jul-02	1.5	7.04	22.5	81.3	-	-	-	8.12	<2	<2	0.10	0.07	09:10
29-Aug-02	0.3	8.25	18.8	88.6	1197	0.6	581	7.73	<2	<2	0.17	0.12	14:45
18-Sep-02	7.4	9.01	13.8	87.1	1230	0.6	597	8.14	<2	<2	0.07	0.05	10:55
10-Oct-02	0.6	11.31	11.9	104.7	1195	0.6	578	8.31	<2	<2	<0.05	<0.05	13:00

Lateral 310-2													
Date	Flow	DO	Temp	% Sat	Cond	Salinity	TDS	pH	TSS	TVSS	Total P	Ortho P	Time
	cfs	mg/L	Cel		µS	ppt	mg/L		mg/L	mg/L	mg/L	mg/L	
25-Apr-02	0.0												10:35
21-May-02	1.2	8.50	11.5	78.1	1099	0.5	525	7.97	7	2	<0.05	<0.05	11:50
18-Jun-02	1.7	7.64	16.5	78.3	-	-	-	8.05	3	2	0.07	<0.05	12:05
18-Jul-02	1.0												
29-Aug-02	1.5												
18-Sep-02	0.7	9.52	15.9	96.3	940	0.5	456	8.05	9	4	0.06	0.05	15:00
10-Oct-02	0.9	9.54	10.2	85.1	991	0.5	475	7.88	25	7	0.09	<0.05	11:45

Lateral 38													
Date	Flow	DO	Temp	% Sat	Cond	Salinity	TDS	pH	TSS	TVSS	Total P	Ortho P	Time
	cfs	mg/L	Cel		µS	ppt	mg/L		mg/L	mg/L	mg/L	mg/L	
25-Apr-02	2.7	10.08	14.3	98.4	1182	0.6	573	8.31	3	2	<0.05	<0.05	15:55
21-May-02	1.5	10.74	10.9	97.2	1069	0.5	508	8.6	2	2	<0.05	<0.05	12:40
18-Jun-02	3.3	8.21	16.5	84.1	-	-	-	8.17	<2	<2	0.07	<0.05	11:15
18-Jul-02	1.8	9.24	23.7	109.1	969	0.5	468	8.43	<2	<2	0.11	0.05	14:15
29-Aug-02	2.5	12.67	19.5	138.0	972	0.5	471	8.55	6	5	0.11	0.05	13:00
18-Sep-02	1.2	15.02	18.4	160.2	898	0.4	433	8.84	<2	<2	0.07	0.05	15:50
10-Oct-02	1.8	12.35	11.8	114.1	978	0.5	472	8.30	4	4	0.08	<0.05	12:30

Lateral 34													
Date	Flow	DO	Temp	% Sat	Cond	Salinity	TDS	pH	TSS	TVSS	Total P	Ortho P	Time
	cfs	mg/L	Cel		µS	ppt	mg/L		mg/L	mg/L	mg/L	mg/L	
25-Apr-02	1.9	9.06	16.3	92.3	1214	0.6	579	8.27	8	4	0.05	<0.05	15:30
21-May-02	3.9	9.51	11.8	91.5	1092	0.5	524	8.62	5	4	0.06	<0.05	12:15
18-Jun-02	2.5	8.55	16.8	88.3	-	-	-	8.33	2	2	0.07	<0.05	11:40
18-Jul-02	3.0	9.14	23.8	108.2	969	0.5	468	8.51	<2	<2	0.11	0.05	15:00
29-Aug-02	1.7	12.10	19.3	131.1	978	0.5	470	8.42	<2	<2	0.16	0.05	12:15
18-Sep-02	3.6	11.64	18.0	123.1	911	0.4	440	8.56	<2	<2	0.08	0.05	15:25
10-Oct-02	3.6	12.19	10.8	110.2	989	0.5	475	8.32	6	6	0.08	<0.05	12:10

Lateral 55													
Date	Flow	DO	Temp	% Sat	Cond	Salinity	TDS	pH	TSS	TVSS	Total P	Ortho P	Time
	cfs	mg/L	Cel		µS	ppt	mg/L		mg/L	mg/L	mg/L	mg/L	
25-Apr-02	0.0												11:15
21-May-02	2.9	9.32	12.1	86.6	1088	0.5	522	8.54	<2	<2	<0.05	<0.05	13:30
18-Jun-02	0.8	7.66	16.0	77.6	-	-	-	8.19	<2	<2	0.06	0.05	10:40
18-Jul-02	3.8	6.22	21.8	70.9	-	-	-	8.02	2	2	0.10	0.06	08:45
29-Aug-02	1.8	11.61	19.9	127.3	724	0.3	347	8.34	<2	<2	0.07	0.06	14:15
18-Sep-02	0.4	7.90	15.2	78.6	972	0.5	468	8.17	<2	<2	0.08	0.05	10:20
10-Oct-02	0.0												12:45